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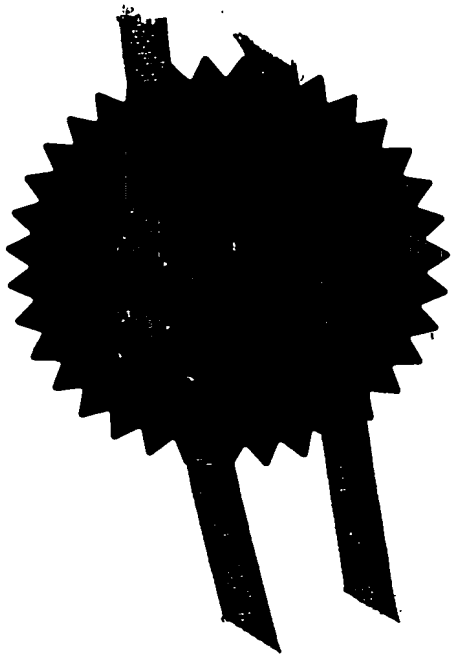

Signed

Dated 16 November 2004

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GB0325358.0

By virtue of a direction given under Section 30 of the Patents Act 1977, the application is proceeding in the name of:-

PETER COOK MANAGEMENT LTD
Incorporated in the United Kingdom
Carterton Industrial Estate
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ADP No. 08875346001

Patents Form 1/77

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1.	Your reference	P3192GB
2.	Patent application number *(The Patent Office will fill in this part)*	0325358.0 — 30 OCT 2003
3.	Full name, address and postcode of the or of each applicant *(underline all surnames)*	Peter Cook International PLC Caterton Oxfordshire OX18 2EU SECTION 30 (1977 ACT) APPLICATION FILED 18/5/04
	Patents ADP number *(if you know it)*	6046788001
	If the applicant is a corporate body, give the country/state of its incorporation	
4.	Title of the invention	POWERED FURNITURE
5.	Name of your agent *(if you have one)*	SHELLEY, Mark R
	"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*	K R Bryer & Co 7 Gay Street Bath BA1 2PH
	Patents ADP number *(if you know it)*	10777002.

6.	If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number	Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*
7.	If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application		Number of earlier application	Date of filing *(day / month / year)*
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POWERED FURNITURE

This invention relates to powered furniture and in particular concerns powered recliner chairs and lift-recliner chairs.

A typical recliner chair comprises a base that sits on the floor, a seat portion that supports a generally horizontal seat cushion and a back portion that may be fixed to the seat or pivotally connected to it. Recliner chairs are also usually provided with a footrest at the front of the chair which is movable between a vertical orientation when the chair is in a generally upright configuration for sitting, and a generally horizontal orientation when the chair is reconfigured for reclining. Recliner chairs are known where the seat portion moves during the reclining operation to tilt the seat slightly downwards at the rear edge and raise the front edge of the seat. Other types of recliner seat are known where the seat is fixed with respect to the base and only the back and footrest are moved when the seat is reclined.

Various types of lift-recliner chairs have been developed, principally for the elderly and less physically able people, to provide assistance when moving out of the chair to a standing position. Typical lift recliner chairs are described in US-A-4,852,939, US-A-4,993,777 and US-A-5,265,935 which describe various arrangements of levers, links and motors for raising the chair from a seated to a standing position.

The actuating mechanisms of known recliner and lift-recliner chairs are generally mechanically complex adding significantly to the cost and complexity of the chair. In

addition, in known lift-recliner chairs the seat and back portion of the chair are typically lifted off of the base when the chair is raised towards the standing position creating entrapment points between the underside of the seat and the base, and in particular in between the levers and links of the operating mechanism that are exposed between the seat and the base when the chair is raised.

There is a requirement to provide a simple actuating mechanism for recliner and lift-recliner chairs which requires fewer moving components than hitherto known designs, and also an actuating mechanism that is relatively simple to construct and to integrate within the structure of a recliner or lift recliner chair.

According to a first aspect of the invention there is provided a lift-recliner chair comprising a base portion, a seat portion pivotally connected to the base portion, a back portion pivotally connected to the seat portion and actuator means for moving the seat portion with respect to the base portion and the back portion with respect to the seat portion whereby to alter the configuration of the chair, wherein the said actuator means is substantially enclosed within the base portion in all configurations of the chair.

The lift-recliner chair according to the above aspect of the invention has the advantage that the actuator means is enclosed within the base portion of the chair, thereby providing a chair in which the actuator means is wholly integrated within the structure of the chair. This can substantially eliminate the risk of entrapment when the chair is moved from one configuration to another, for example when raised or lowered. The

lift-recliner chair according to this aspect of the invention also enables all moving parts of the actuating mechanism to be enclosed within the base portion of an upholstered chair.

The seat portion of the chair may be moved between a substantially horizontal position in which at least part of the seat portion is nested with the base portion and an inclined position in which the seat is extended telescopically from the base. The nested arrangement of the seat portion and the base readily enables the actuator means to be enclosed within the base on the underside of the seat portion so that the actuator means is guarded by the base and seat portions and also hidden from view so that the aesthetic appearance of the chair is also significantly improved. It will be readily apparent to the skilled person that by carefully selecting the clearance dimensions between the nested parts of the chair entrapment points can be substantially eliminated. This is a significant advantage when considered in relation to known types of lift recliner chair where a significant risk of entrapment exists between the moving parts on the underside of the seat portion of the chair between the seat and the base and between the seat and the base when the seat is moved.

In preferred embodiments the seat portion is nested within and extendable from the base portion.

Preferably, the base portion comprises a front and a back panel and a pair of substantially vertical side panels between the front and back panels, and the said seat portion comprises a seat panel and pair of substantially vertical side panels arranged

substantially parallel with and adjacent to the respective base portion side panels.

Preferably, the base portion has a rectangular shape with the side and back panels comprise part of the structural framework of the chair with the front panel being movable with respect to the other panels of the base to a horizontal orientation to provide a foot rest.

Preferably, the seat portion is pivoted to the base portion about a pivot axis positioned towards the front of the base portion, that is to say towards the front panel of the base. In this way it is possible to raise and lower the seat portion of the chair by tilting the seat portion about its pivot axis to provide the lifting function of the chair. By positioning the pivot axis towards the front of the chair the person seated in the chair can be gently raised towards the standing position with substantially no effort since the movement of the seat gently straightens the legs of the person seated since the knee joints of the user's legs are substantially coincident with the pivot axis as the seat is pivoted and raised.

In preferred embodiments the back portion comprises a generally rectangular frame and a pair of pivot arms which extend from the frame and pivotally connect the frame to the seat portion. In this way the pivot arms may comprise part of a bell-crank arrangement for moving the back portion about a pivot axis spaced from the rectangular frame of the seat back. The extended pivot arms readily enable the back portion to be moved by actuator means enclosed within the base portion on the underside of the seat. This is possible where the pivot arms extend into the region on

the underside of the seat panel where they can be connected to an actuator without interfering with other parts of the seat.

In preferred embodiments the pivot arms extend parallel with and adjacent to the respective vertical side panels of the seat, and preferably the pivot arms are positioned on the interior side of the vertical side panels of the seat.

Preferably the back portion pivots away from the seat portion when the seat is moved to an inclined position, that is to say the angle between the seat panel and the seat back is increased.

In preferred embodiments the seat and back portions of the chair are moved independently of each other by dedicated first and second actuators, including a first actuator for moving the seat portion and a second actuator removing the back portion. The first and second actuators are preferably controlled by a microprocessor or the like so that the movements of the seat and back portions of the chair are co-ordinated.

Preferably, the first and second actuators are mounted in fixed relation to the base portion of the chair. In preferred embodiments the actuators are fixed to a structural metal frame on which the side and rear panels of the base are mounted.

The front panel of the base portion is preferably pivotally mounted with respect to the side and rear panels of the base so that it may be moved from a generally vertical orientation in the normal seated configuration of the chair to a generally horizontal

orientation in a reclined configuration of the chair. In this embodiment a third actuator is provided for moving the front panel about its pivot axis. It is preferred that the third actuator is fixed in relation to the side panels of the base and preferably mounted to the same metal frame as the first and second actuators.

According to a second aspect of the invention there is provided a recliner chair comprising a base portion, a seat portion, and a back portion pivotally mounted with respect to the seat portion, and actuator means for moving the back portion about its pivot axis between a generally upright position and a reclined position, wherein the said actuator means is enclosed within the base portion on the underside of the seat.

The recliner chair according to the second aspect of the invention comprises many but not all the features of the lift-recliner chair according to the first aspect of the invention including the enclosure of the actuator means within the base portion of the chair on the underside of the seat. The advantages discussed in relation to the recliner chair relating to the enclosure and integration of the actuator means in the base portion of the chair are therefore equally relevant to the recliner chair according to the second aspect of the invention.

Preferably, the base portion of the recliner chair comprises a front panel pivotally mounted with respect to the seat portion, and the actuator means comprises a first actuator for moving the back portion about its pivot axis and a second actuator for moving the front panel about its pivot axis from a generally vertical orientation to a generally horizontal orientation.

According to a third aspect of the present invention there is provided a recliner chair comprising a base portion, a seat portion, and a back portion pivotally mounted with respect to the base portion, the base portion having a pair of lateral side panels and a front panel pivotally mounted with respect to the said side panels, and a common actuator for moving both the back portion about its pivot axis and the front panel about its pivot axis to alter the configuration of the chair form a generally up-right configuration to a generally reclined configuration, wherein the back portion moves from a generally vertical to an inclined orientation and the front panel moves from a generally vertical to a generally horizontal orientation.

The recliner chair according to the third aspect of the invention shares many of the advantages of the chairs of the aforementioned first and second aspects of the invention but has the further advantage that the chair has a single common actuator for moving both the back portion of the chair and the front panel, so that the configuration of the chair may be changed by the activation of a single actuator acting on both of the backrest and front panel. The third aspect of the invention therefore provides a relatively simple and compact actuator arrangement that is readily integrated into the interior of the base on the underside of the seat panel of the chair.

Preferably, the recliner chair according to the third aspect of the invention further comprises a first cam means for determining the movement path of the back portion with respect to the base portion and a second cam means for determining the movement path of the front panel with respective side panels. The first and second

cam means readily and reliably ensure the movement of the front panel and back portion of the chair are coordinated when the chair is moved from its upright position to its fully reclined position and the intermediate positions therebetween.

In preferred embodiments the first and second cam means are engaged by a cam engagement means connected to the actuator. Preferably the cam engagement means is pivotally mounted with respect to the sides of the base portion for movement by the actuator. It is also preferred that the first and second cam means are pivotally mounted with respect to the sides of the base and that they are pivotally mounted about a common axis.

In preferred embodiments the cam engagement means comprises at least one engagement pin and that the first and second cam means comprise first and second pin engagement slots engaged by the pin.

In preferred embodiments the first and second slots are provided in first and second cam plates pivotally mounted in the interior of the base portion on both sides of the base with each pair of the first and second cam slots being engaged by a respective engagement pin. This arrangement readily enables the actuator load to be transferred evenly to the back portion of the chair and the front panel on both sides of the chair.

In preferred embodiments the common actuator comprises a linear actuator.

Various embodiments of the present invention will now be more particular described,

by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view from the front of the frame of the lift-recliner chair according to an embodiment of the present invention;

Figure 2 is the perspective view of the frame of the chair shown in Figure 1 viewed from the underside of the chair frame;

Figure 3 is a perspective view of a chair of Figure 1 from above;

Figure 4 is a perspective view of the frame of the chair of Figure 1 viewed from the side showing the rear of the chair with the frame in a partly raised configuration;

Figure 5 is a perspective view similar to that of Figure 1 of the frame of the chair shown in a fully raised configuration; and,

Figure 6 is a cross-section view through the base of a lift-recliner chair according to another embodiment of the invention.

Figure 1 shows the frame of a lift-recliner chair 10 according to an embodiment of the present invention. The frame comprises three main sections including a base portion 12 a seat portion 14 and a back portion 16. The base portion includes a pair of lateral side panels 18 and a rear panel 20 secured to the respective sides of the rectangular metal frame 22 on the underside of the chair. The panels 18 and 20 and the other panels of the frame of the chair shown in Figures 1 to 5 are preferably of MDF type board material but the invention also contemplates other board material such as wood, plywood or plastic etc..

The metal frame 22, best seen in the view of Figure 2, comprises a pair of lateral side members 24, a front cross member 26 extending between the side members 24 at the

front of the chair and a pair of intermediate cross members 28 and 30 which extend between the side members 24 at a point midway along the length of the side member and towards the rear of the chair respectively. The side panels 18 are secured to the side members 24 of the frame with the rear panel 20 secured to the ends of the respective side panels at the rear of the chair to provide a box-type structure for supporting the other parts of the chair.

The base portion 12 further comprises a front panel 32 which is pivotally mounted to the lateral side panels 18 of the base by a linkage arrangement 34 at both ends of the panel 32 adjacent to the respective side panels 18. The linkage arrangement 34 is of a known arrangement and enables the front panel 32 to be moved from the position shown in Figure 1, where it has a generally vertical orientation, to the position shown in Figure 2, where it has a substantially horizontal configuration.

The seat portion 14 comprises a similar box-type panel frame secured to a further metal rectangular frame 36, as can best be seen in the view of Figure 3. The metal frame 36 includes a pair of lateral side members 38 to which the lateral side panels 40 of the seat are attached, a front cross member 42 at the front of the seat portion, a rear cross member 44 at the rear of the seat and an intermediate cross member 46 approximately midway between the front member 42 and rear member 44. The cross members extend between the side members 38. The rectangular frame section between the cross members 44 and 46 at the rear of the seat has a slightly reduced width dimension to that of the rectangular frame section between the front cross member 36 and intermediate member 46. For reasons that will become apparent later

in this description this reduced width dimension provides a clearance between the side members 38 of the frame and the respective side panels 40 of the seat towards the rear of the chair. The clearance dimension is approximately equal to the width dimension of the metal tubes that constitute the metal frame.

The seat portion 14 is nested within the base portion 12 and pivotally connected to the base portion about a pivot axis perpendicular to the lateral sides 40 at the front of the chair. The seat portion is pivotally mounted to the base portion by pivot pins (not shown) which extend from pivot plates 48 through corresponding apertures in the side panels 40 and 18 towards the front of the chair.

The rear most ends of the side panels 40 are arcuate having a centre of curvature defined by the pivot axis of the mounting pins so that the rear part of the seat portion can move freely with respect to the base end panel 20 when the seat portion is pivoted about its axis in use. Similarly, an end panel 50, as seen in Figure 4 which extends between the side panels 40 at the rear of the chair also has a curvature which follows the curvature of the arcuate end faces 49, that is to say it has the pivot axis of the seat portion as its centre of curvature.

The width dimension of the seat portion between the side panels 40 is slightly less than the width dimension between the base side panels 18 so that the seat portion nests between the side panels 18 when in the sitting configuration shown in Figure 1 and is extendable telescopically there from when pivoted about its pivot axis to the lift position shown in Figure 5.

The back portion of the chair frame also comprises a rectangular frame in which a pair of a pair of elongate pivot arms 52 on the lateral sides of the back portion 16. The arms 52 are joined together by a pair of cross members 54 and 55 towards the top and the bottom part of the back portion 16. The back portion 16 is pivotally connected to the seat portion 14 in the same way that the seat portion is pivotally connected to the base 12, that is to say by means of a pair of pivot pins 56 secured to pivot pin plates 58 on the respective side panels 40. The pins 56 pass through corresponding apertures in the respective panels 40 and pivot arms 52. As can best be seen in the view of Figure 2 the pivot arms 52 extends beyond the pivot pins 56 into the interior region of the base portion 12. The lower part of the pivot arms 52 pass through the gaps created between the undersize frame part towards the rear of the frame 36 and the side panels 40 on the seat. The ends of the pivot arms extend beyond the metal seat frame 36 into the region on the underside of the frame 36 and are joined together at their remote ends by a metal cross bar member 60.

The pivot arms 52 are free to rotate with respect to the seat portion, and hence the base portion, in a manner that enables the back portion to be reclined with respect to the seat portion either for altering the configuration of the chair from an upright configuration to a reclined configuration or to a raised configuration as shown in Figure 5.

Three linear actuators 62, 64 and 66 are mounted on the metal frame 22 in the interior of the base portion 12 on the underside of the seat frame 36. A first of the actuators

62 is mounted on the intermediate cross member 28 with the end of the actuator ram 63 fixed to the rear face of the front panel 32 adjacent to the upper edge 70 of the front panel. Extension of the actuator arm 63 moves the front panel from its generally vertical orientation as shown in Figure 1 to the horizontal orientation shown in Figure 2 to provide a footrest support. Actuator 64 is mounted to the front cross member 26 of the frame 22. The actuator arm 65 of the actuator 64 is connected at its extendable end to the cross member 46 of the metal seat frame 36 so that extension of the actuator arm 65 moves the seat portion 14 about its pivot access to tilt the seat portion between the positions shown in Figures 1 and 5. The third actuator 66 is also mounted to the cross member 26 of the metal frame 22 with the extendable end of its actuator arm 67 connected to the cross member 60 extending between the pivot arms 52. Extension of the actuator arm 67 by the actuator 66 moves the back portion 16 about its pivot access to alter the tilt angle of the back portion with respect to the seat portion. Retraction of the actuator arm 67 causes the angle between the back portion and seat portion to increase, for example when the chair is reclined or when the seat portion is raised to the standing position. Extension of the actuator arm 67 reverses this operation and when fully retracted the back portion is moved to its upright position with respect to the seat portion.

Actuators 62, 64 and 66 are of a known type, for example Dewart type 34931 linear actuators, that comprise electrical motors controlled by control electronics which may be in the form of a microprocessor suitably programmed to provide co-ordinated control of the actuators for co-ordinated movement of the moveable sections of the chair, both for reclining and lifting movements.

It will be understood that the configuration of the chair shown in Figures 1 to 5 may be changed from the upright configuration shown in Figure 1 to a reclined configuration where the back portion 16 is reclined with respect to the remainder of the chair and the front panel 32 is raised to provide a foot rest with or without movement of the seat portion, and that the configuration may be changed from the upright configuration to the raised configuration shown in Figure 5 for assisting the seated user out of the chair.

A recliner chair according to another aspect of the present invention comprises an operating mechanism as shown in the drawing of Figure 6. Figure 6 is a cross section view through the base portion of a recliner chair with an operating mechanism 71 housed substantially within the interior of the base of the chair. The base of the chair shown in Figure 6 is similar to the base of the chair described with reference to Figures 1 to 5 in that it comprises a generally rectangular box-type structural framework including a metal base frame 72, of a tubular metal construction, and a pair of lateral side panels 74, preferably but not necessarily of MDF board material, bolted to the side members of the frame 72 on respective sides of the chair.

A front panel 76 is pivotally mounted to the side panels 74 by respective link assemblies 78 mounted on the interior side of the side panels 74 on both sides of the chair. The link assembly 78 and front panel 76 are substantially identical to the linkage system 34 and front panel 32 of the chair described with reference to Figures 1 to 5. The link assembly 78 on each side of the chair includes four link elements that

are pivotally connected together, including a first link element 80 which is pivoted at one end to the side panel 74 and at its other end to one end of a second link element 82. The other end of the link element 82 is pivotally connected to a bracket 83 secured to the interior facing surface of the front panel 76 towards the top edge of the panel when configured in its vertical orientation as shown in Figure 6. A third link element 84 is pivotally connected at one end thereof to the side panel 74 between the link element 80 and the front panel 76 and at the other end thereof to one end of a fourth link element 86, the other end of which is also pivotally connected to the bracket 83 at a position spaced from the link 82 and approximately one third along the depth of the front panel 76. The second and third link elements 82 and 84 are also pivotally connected together at the point of their mutual intersection (not shown).

The front panel 76 is deployed from its vertical orientation shown in Figure 6 to a generally horizontal orientation to provide a foot rest by activation of a linear actuator 88 located within the interior of the base of the chair. The linear actuator 88 may be a Dewart type 34931 linear actuator comprising an electric motor 90 at one end thereof and a piston arm 92 at the other end thereof which is extendable from a housing 94. The end of the actuator 88 nearest the motor section 90 is pivotally connected to a bracket 96 integral with and upstanding from the base frame 72 at the front of the frame 72. At the other end of the actuator the extendable arm 92 is pivotally connected at its end to a bracket 98 extending on one side of a square cross section metal tube member 100 to which extends along the width of the chair and is welded to respective metal bell-crank plates 102 at opposite sides of the chair, only one of which is shown in the cross-section view of Figure 6. The bell-crank plates 102 are

substantially parallel with the respective side panels 74 and perpendicular to the metal tube which connects the bell-crank plates 102 on either side of the chair together. Each bell-crank plate 102 is pivotally connected to its respective side panel 74 by a pin type mounting 104 positioned towards the top edge 106 of the side panel 74. Each bell-crank plate 102 is provided with an upstanding engagement pin 108 extending perpendicular to the plane of the plate. The pin 108 constitutes a cam engagement means and is engaged within respective first and second cam slots 110 and 112 provided in the respective cam plates 114 and 116 pivotally mounted to the respective side panels 74 towards the rear of the chair on both sides thereof. The first and second cam plates 114 and 116 are pivotally mounted on a common pivot pin 118 which extends into the interior of the base portion from the side panel 74. The cam plates 114 and 116 are generally planar and parallel with the bell-crank 102 and the side panel 74.

The first cam plate 114 constitutes a seat back cam for determining the movement path of the back portion of the chair (not shown) with respect to the base. The second cam plate 116 constitutes a footrest cam for determining the movement path of the front panel 76 with respect to the side panels of the base. The seat back cam 114 has a shallow V-shape with the mounting pin 118 positioned at the apex of the V. The upper arm of the V, i.e. the arm shown towards the top of the drawing in Figure 6, constitutes a lever for connecting the seat back cam plate to the back portion of the chair, while the cam slot 110 is formed in the lower arm of the V. The cam slot 110 includes a linear portion 120 and an arcuate portion 122 with the linear portion 120 extending towards the extremity of the V and the arcuate portion disposed towards the

middle part of the V in the lower arm. The curvature of the arcuate portion 122 is such that the side of the slot facing the front of the chair in the view of Figure 6 is concave.

The cam plate 116 is generally arcuate and is pivotally connected at one end of the arc to the mounting pin 118 and at its other end to a linear push rod link element 124. The cam slot 112 in the cam plate 116 also comprises a linear section 126 and a longer arcuate section 128. The arcuate section 128 of the slot extends along the majority of the arcuate length of the cam plate from the lower end of the plate that is connected to the push rod 124 along approximately 75% of the arc of the plate where the remainder of the slot is linear.

The linear push rod 124 connects the link assembly 78 to the cam plate 116. One end of the push rod 124 is pivotally connected to the first link 80 at a point substantially midway along its length, and the other end is pivotally connected to the cam plate 116.

The operating mechanism described with reference to Figure 6 provides for simultaneous co-ordinated pivotal movement of the back of the chair and the foot rest front panel 76. In the drawing of Figure 6 the operating mechanism is shown configured for a chair in an upright configuration with the front panel foot rest 76 retracted to the vertical position at the front of the chair and the back portion of the chair substantially upright with respect to the base and seat. By activating the actuator 88 to retract the arm 92 into the housing 94 the bell crank 102 is caused to rotate about the pin 104. This movement causes the cam engagement pin 108 to follow a circular

path about the centre of the pin 104, in a clockwise direction when viewed in the plane of the drawing of Figure 6. This then causes the cam plate 114 to follow the pin 108 so that the cam plate rotates about the mounting pin 118 in a clockwise direction, as viewed in the plane of the drawing of Figure 6, thereby causing the back of the chair to rotate towards a reclined position with respect to the seat. Simultaneously, the slot 112 in the cam plate 116 is constrained to follow the movement of the cam pin 108 so that the plate 116 also rotates in a clockwise direction about the mounting pin 118. The fixed relationship between the position of the pin 118 and the end of the push rod 124 connected to the plate 116 causes the push rod link 124 to move in a general direction towards the front panel of the chair pivoting the links 80 and 84 of the link assembly also in a clockwise direction so that the front panel 76 is moved from the vertical position shown in Figure 6 towards its deployed horizontal position to provide a foot rest.

Although aspects of the invention have been described with reference to the embodiments shown in the accompanying drawings, it is to be understood that the invention is not so limited to those precise embodiments and that various changes and modifications may be effected without further inventive skill and effort. For example, the lift recliner chair described with reference to Figures 1 to 5 may be modified to provide a reclining function only in the sense that the base portion of the chair is provided with only two actuators, one for reclining the back portion of the chair with respect to the base and a fixed seat, and another for deploying the front panel from its vertical position to its horizontal position to provide a foot rest for the chair. It will be appreciated that various changes and modifications may be made to the chairs

described herein with any of the integers described in one embodiment being interchangeable with integers in another embodiment, and that the embodiments maybe modified by deletion or addition of any of the integers described with reference to all embodiments herein described.

CLAIMS

1. A lift-recliner chair comprising a base portion, a seat portion pivotally connected to the base portion, a back portion pivotally connected to the seat portion and actuator means for moving the seat portion with respect to the base portion and the back portion with respect to the seat portion, whereby to alter the configuration of the chair, wherein the said actuator means is substantially enclosed within the base portion in all configurations of the chair.

2. A lift-recliner chair as claimed in Claim 1 wherein the seat portion is movable between a substantially horizontal position in which at least part of the seat portion is nested with the base portion and an inclined position in which the seat is telescopically extended from the base.

3. A lift recliner chair as claimed in Claim 1 or Claim 2 wherein the seat portion is nested within and extendable from the base portion

4. A lift-recliner chair as claimed in any of Claims 1 to 3 wherein the base portion comprises a front and a back panel and a pair of substantially vertical side panels between the front and back panels, and the said seat portion comprises a seat panel and pair of substantially vertical side panels arranged substantially parallel with and adjacent to the respective base portion side panels.

5. A lift-recliner chair as claimed in Claim 4 wherein the seat portion is pivoted

to the base portion about a pivot axis positioned towards the front of the base portion.

6. A lift-recliner chair as claimed Claim 5 wherein the back portion comprises a generally rectangular frame and a pair of pivot arms which extend from the frame and pivotally connect the frame to the seat portion.

7. A lift-recliner chair as claimed in Claim 6 wherein the pivot arms comprise part of a bell-crank arrangement for moving the back portion about a pivot axis spaced from the said rectangular frame.

8. A lift-recliner chair as claimed in Claim 6 or Claim 7 wherein the pivot arms extend parallel with and adjacent to respective vertical side panels of the seat portion on an interior side thereof.

9. A lift-recliner chair as claimed in any preceding claim wherein the said back portion pivots away from the seat portion when the seat portion is moved to an inclined position.

10. A lift-recliner chair as claimed in any preceding claim wherein the said actuator means comprises a first actuator for moving the said seat portion and a second actuator for moving the back portion.

11. A lift-recliner chair as claimed in any preceding claim wherein the said first and second actuators are mounted in fixed relation to the base portion.

12. A lift-recliner chair as claimed in Claim 4 or any of Claims 5 to 10 when dependent directly or indirectly on Claim 4 wherein the front panel of the base is pivotally movable with respect to the side and rear panels of the base from a generally vertical position to a generally horizontal position.

13. A lift-recliner chair as claimed in Claim 12 wherein the said actuator means comprises a third actuator fixed in relation to the fixed side panels of base for moving the said front panel about its pivot axis.

14. A recliner chair comprising a base portion, a seat portion, and a back portion pivotally mounted with respect to the seat portion, and actuator means for moving the back portion about its pivot axis between a generally upright position and a reclined position, wherein the said actuator means is enclosed within the base portion on the underside of the seat.

15. A recliner chair as claimed in Claim 14 wherein the base portion comprises a front panel pivotally mounted with respect to the seat portion and wherein the said actuator means comprises a first actuator for moving the back portion about its pivot axis and a second actuator for moving the front panel about its pivot axis from a generally vertical orientation to a generally horizontal orientation

16. A recliner chair comprising a base portion, a seat portion, and a back portion pivotally mounted with respect to the base portion, the base portion having a pair of

lateral side panels and a front panel pivotally mounted with respect to the said side panels, and a common actuator for moving both the back portion about its pivot axis and the front panel about its pivot axis to alter the configuration of the chair form a generally up-right configuration to a generally reclined configuration, wherein the back portion moves from a generally vertical to an inclined orientation and the front panel moves from a generally vertical to a generally horizontal orientation.

17. A recliner chair as claimed in Claim 16 further comprising a first cam means for determining the movement path of the back portion with respect to the base portion.

18. A recliner chair as claimed in Claim 16 or Claim 17 further comprising a second cam means for determining the movement path of the front panel with respect to the side panels.

19. A recliner chair as claimed in Claim 18 wherein the said first and second cam means are engaged by a cam engagement means connected to the said actuator.

20. A recliner chair as claimed in Claim 19 wherein the said cam engagement means is pivotally mounted with respect to the sides of the said base portion for pivotal movement by the said actuator.

21. A recliner chair as claimed in Claim 20 wherein the said first and second cam means are pivotally mounted with respect to the said sides of the base portion.

22. A recliner chair as claimed in Claim 21 wherein the said first and second cam means are pivotally mounted about a common pivot axis.

23. A recliner chair as claimed in any one of claims 19 to 22 wherein the cam engagement means comprises at least one engagement pin, and the said first and second cam means comprise first and second pin engagement slots engaged by the said pin.

24. A recliner chair as claimed in Claim 23 wherein the said first and second slots are provided in respective first and second cam plates pivotally mounted in the interior of the base portion of the chair on both lateral sides thereof, each pair of first and second cam slots being engaged by a respective engagement pin.

25. A recliner chair as claimed in any one of Claims 16 to 24 wherein the actuator comprises a linear actuator.

27. A recliner chair as claimed in any one of Claims 16 to 26 wherein the said actuator means is enclosed within the said base portion on the underside of the seat.

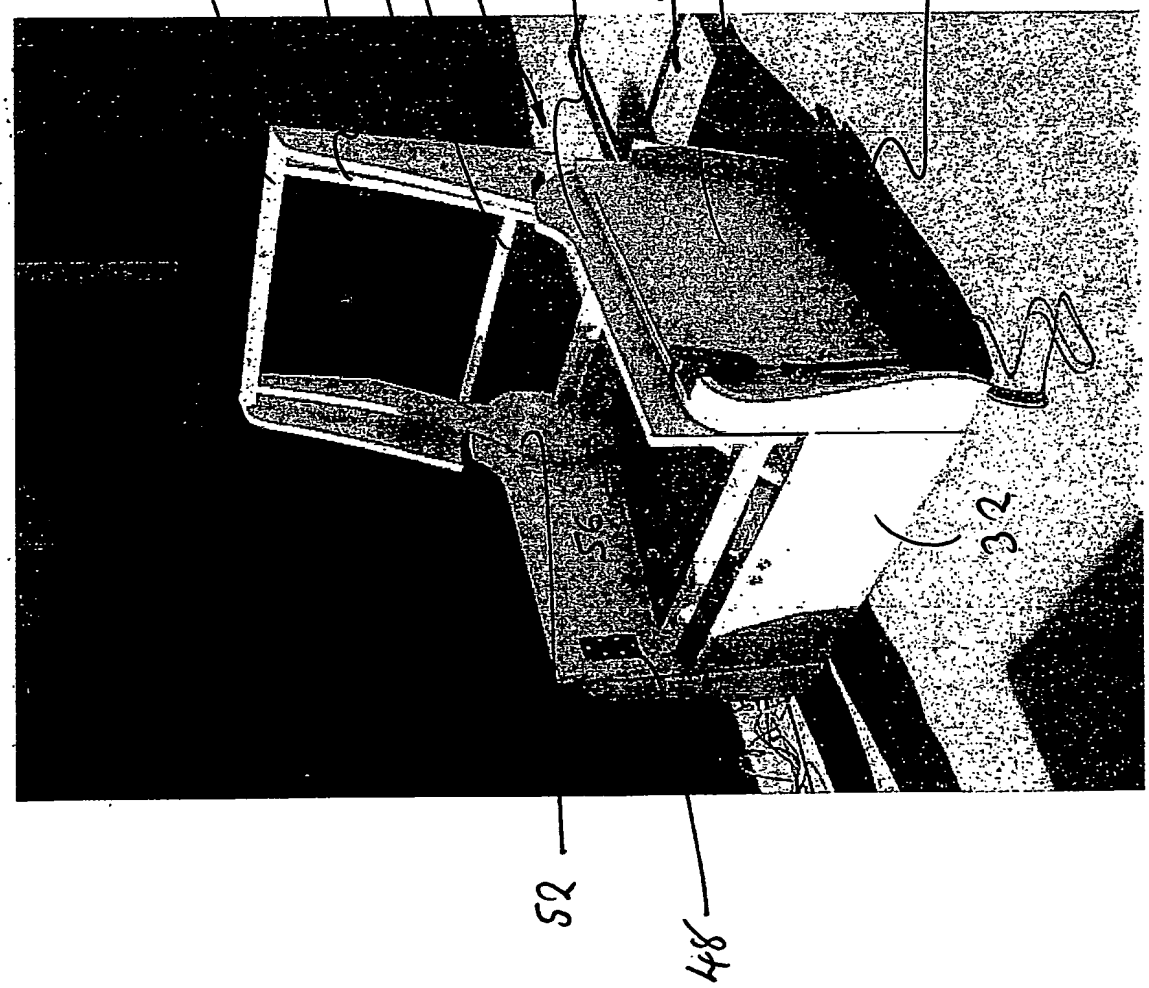


FIG 1

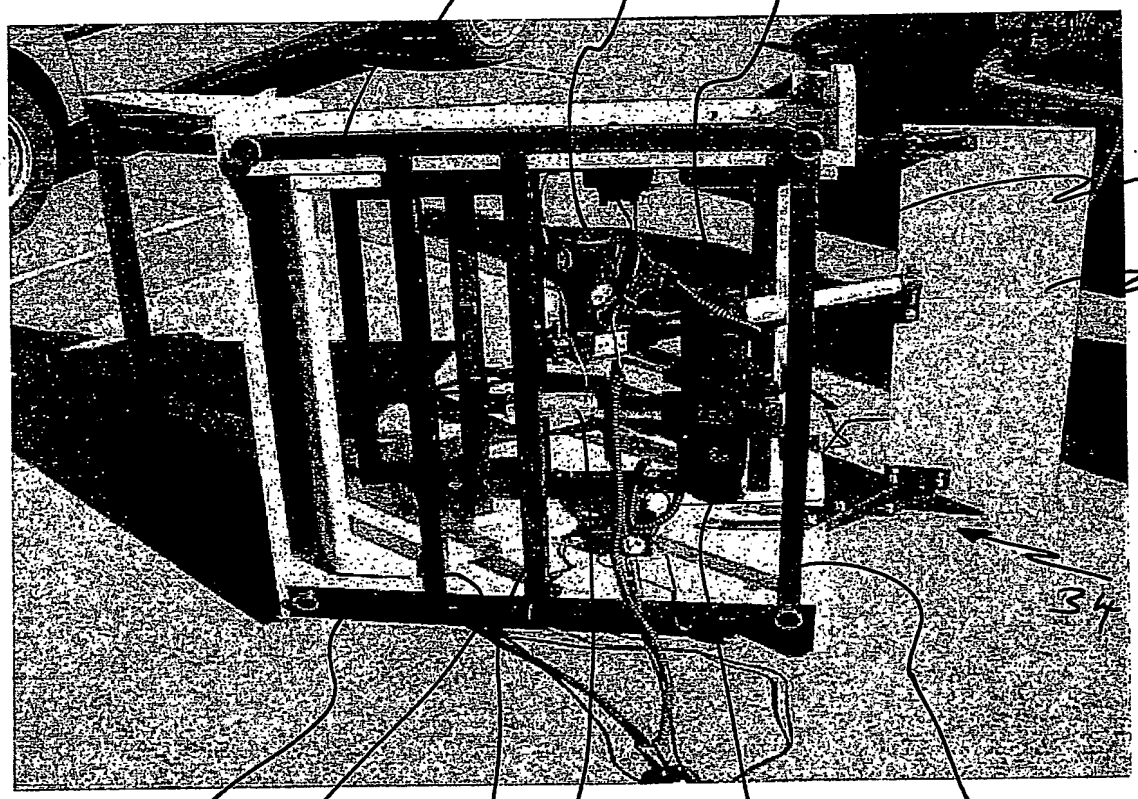
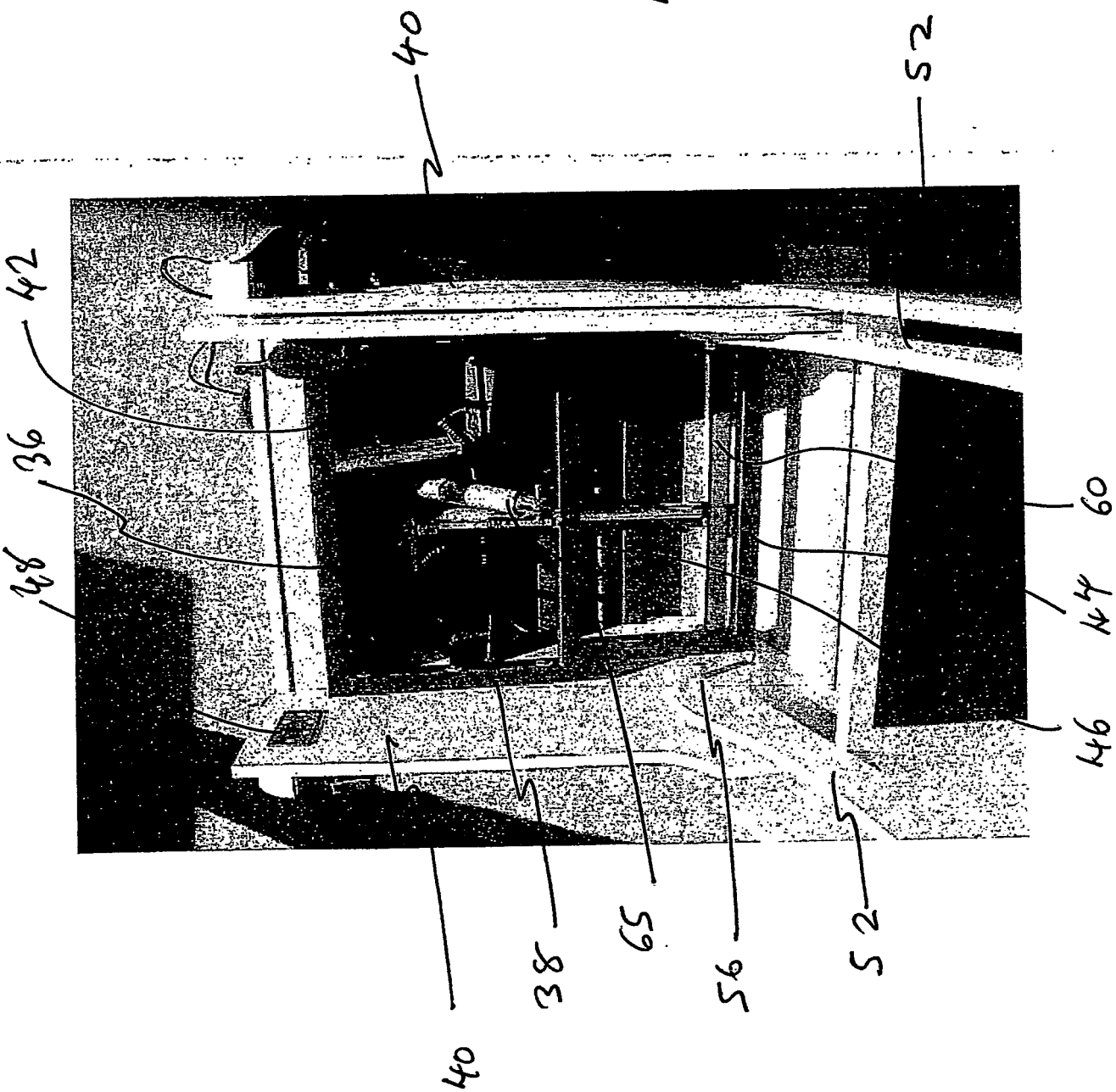


FIG 2

FIG 3



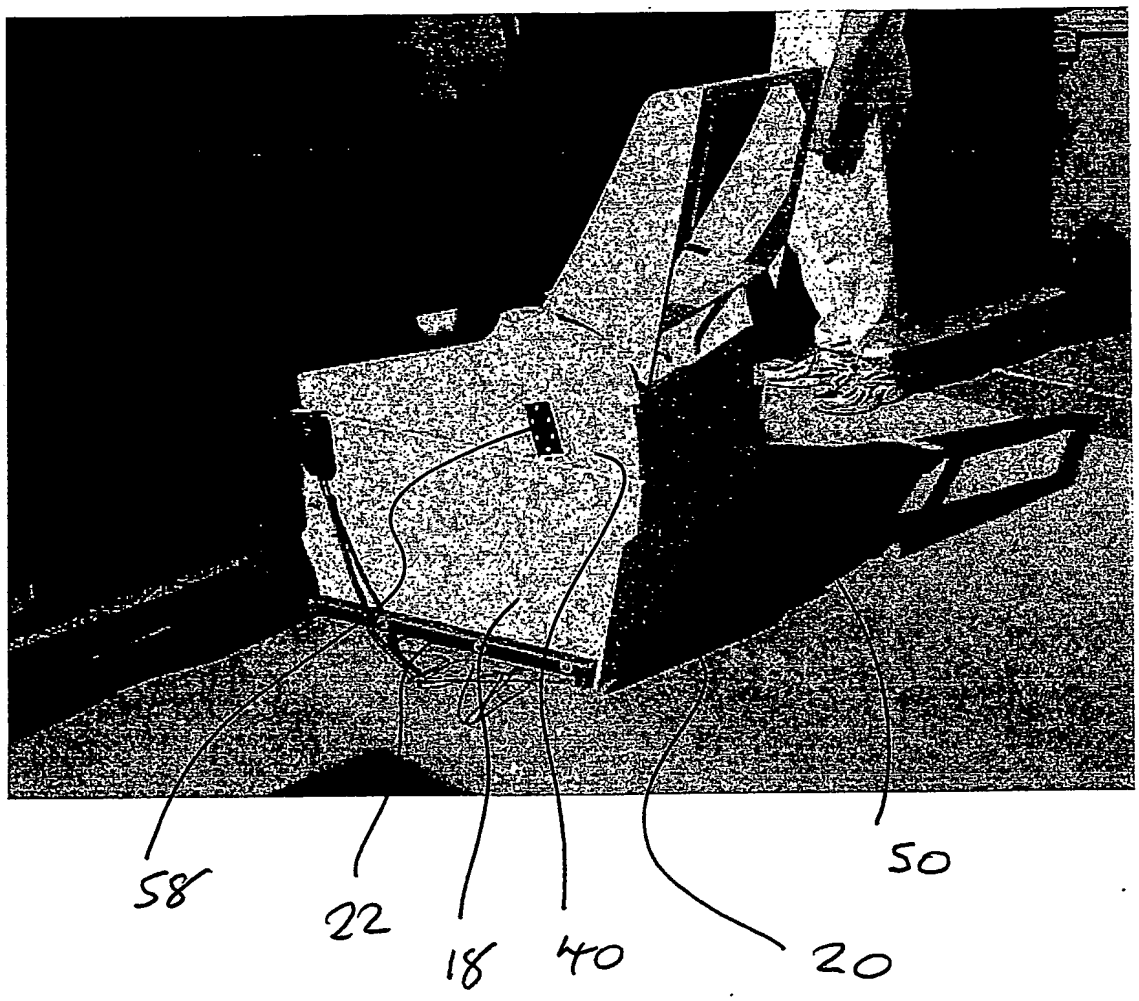
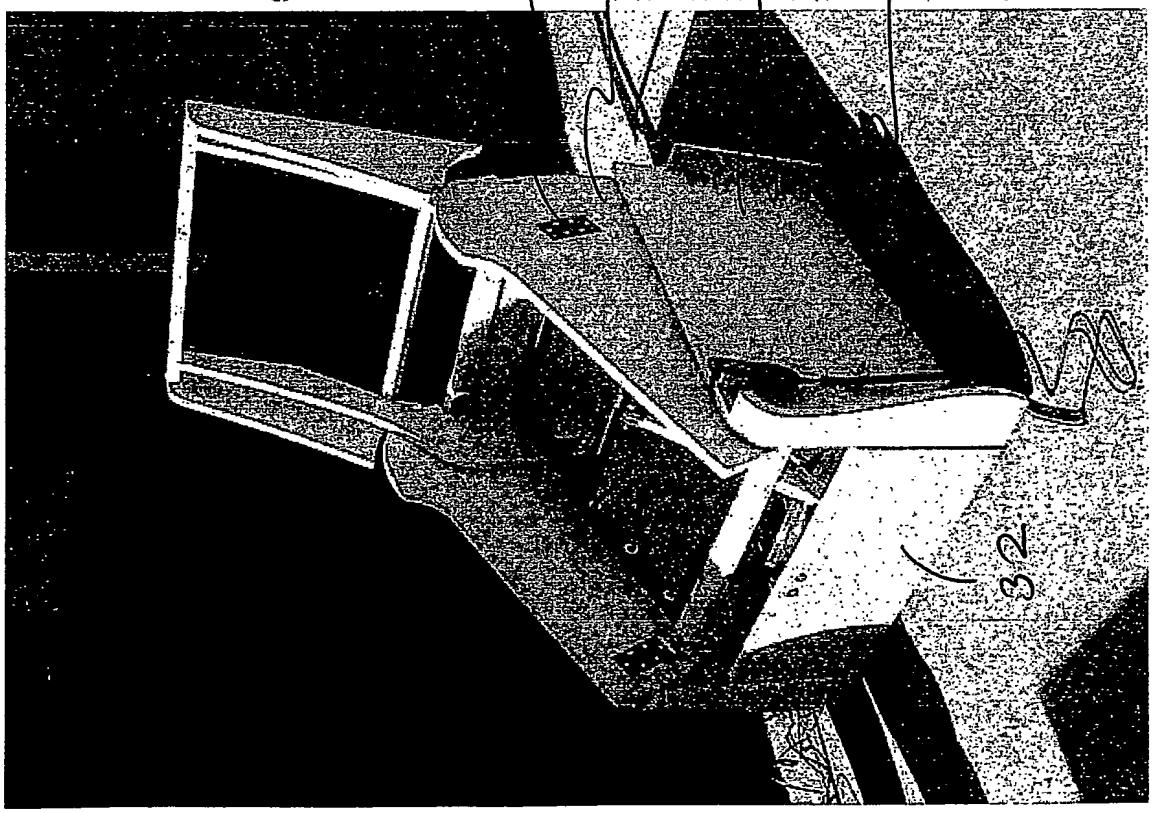
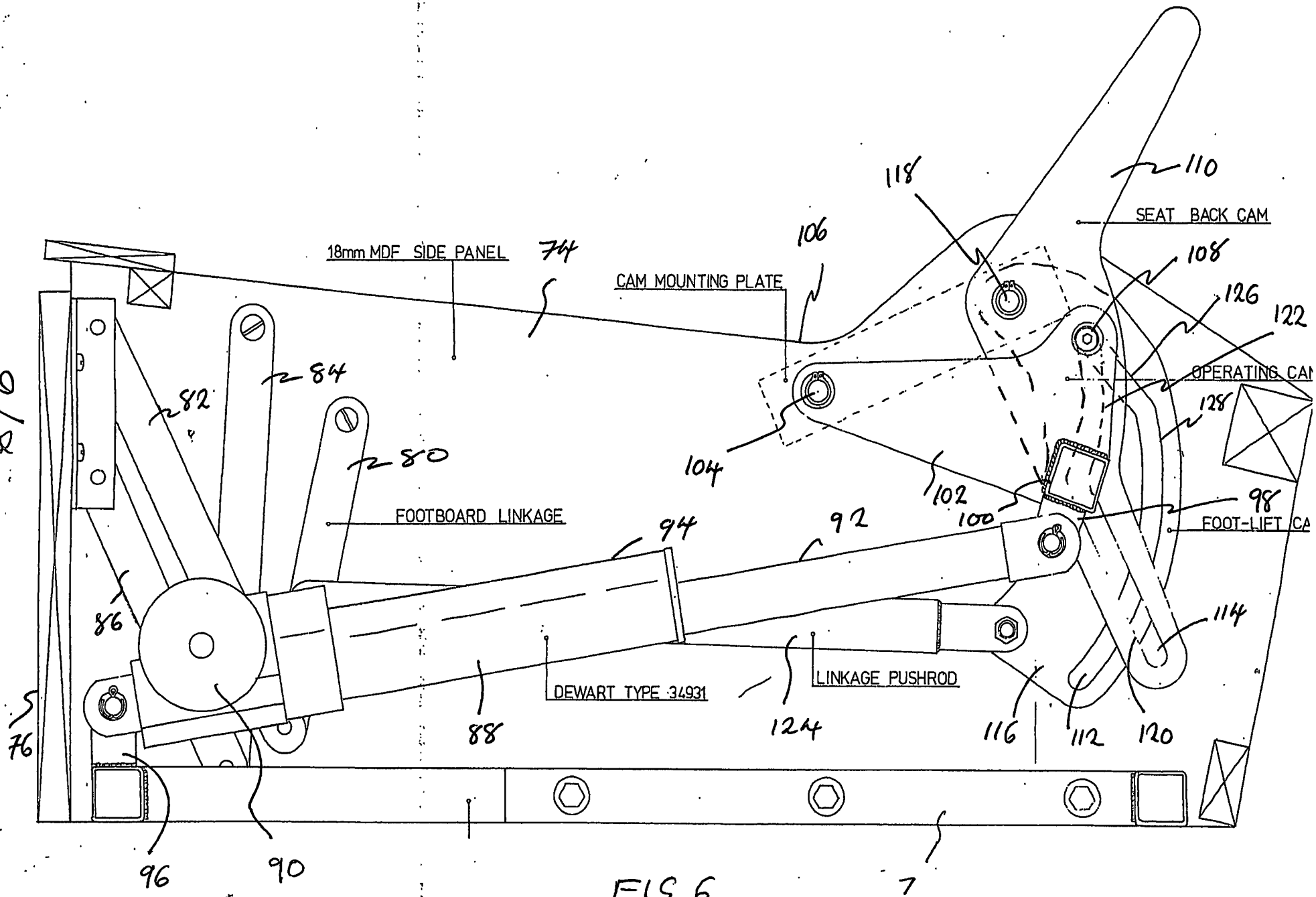


FIG 4

FIG 5

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74
CAM MOUNTING PLATE
106
118
110
SEAT BACK CAM
108
126
122
OPERATING CAM
128
104
102
100
98
FOOT-LIFT CA
82
84
80
FOOTBOARD LINKAGE
94
92
86
114
DEWART TYPE 34931
LINKAGE PUSHROD
88
124
116
112
120
76
96
90
7

FIG 6

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